

Amendments to the Claims

1 Claim 1 (original): In a short-range wireless networking environment, a method of enabling  
2 communication between at least one end device and at least one application server, comprising the  
3 steps of:  
4 providing at least one access point (AP), wherein each of the APs has at least one short-  
5 range wireless connection and at least one network connection;  
6 providing at least one extension point (EP), wherein:  
7 each of the EPs has at least two short-range wireless connections;  
8 at least one of the EPs communicates with at least one of the APs; and  
9 at least one of the EPs communicates with at least one of the end devices; and  
10 transmitting traffic between a selected one of the application servers and a selected one of  
11 the end devices, wherein the transmitted traffic flows through a selected one of the APs and at least  
12 one of the EPs.

1 Claim 2 (original): The method according to Claim 1, wherein a short-range wireless link  
2 established through at least one of the two short-range wireless connections uses a protocol known  
3 as "Bluetooth".

1 Claim 3 (original): The method according to Claim 1, wherein one of the at least two short-range  
2 wireless connections uses a directional antenna.

1 Claim 4 (original): The method according to Claim 3, wherein the directional antenna is used to

2 communicate with a selected one of the APs.

1 Claim 5 (original): The method according to Claim 3, wherein the directional antenna is used to  
2 communicate with another EP.

1 Claim 6 (original): The method according to Claim 1, wherein one of the at least two short-range  
2 wireless connections uses an omnidirectional antenna.

1 Claim 7 (original): The method according to Claim 6, wherein the omnidirectional antenna is used  
2 to communicate with a selected one of the end devices.

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1 Claim 8 (original): The method according to Claim 6, wherein the omnidirectional antenna is used  
2 to communicate with another EP.

1 Claim 9 (original): The method according to Claim 1, wherein each EP is powered using a  
2 photovoltaic array or photovoltaic module.

1 Claim 10 (original): The method according to Claim 1, wherein each EP comprises an antenna  
2 controller, an amplifier, a power supply, and a short-range communication function.

1 Claim 11 (original): The method according to Claim 10, wherein the short-range communication  
2 function is a Bluetooth module.

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1 Claim 12 (original): The method according to Claim 1, wherein each EP comprises an antenna  
2 controller, an amplifier, a power supply, and a short-range radio frequency communication module.

1 Claim 13 (original): The method according to Claim 12, wherein the short-range radio frequency  
2 communication module is a Bluetooth module.

1 Claim 14 (original): The method according to Claim 1, wherein the at least one EP communicating  
2 with the at least one AP and the at least one EP communicating with the at least one end device are  
3 the same EP.

1 Claim 15 (original): The method according to Claim 1, further comprising the step of providing a  
2 connection table which maintains a plurality of EP parameter blocks.

1 Claim 16 (original): The method according to Claim 15, wherein the connection table is provided  
2 at a network control server.

1 Claim 17 (original): The method according to Claim 15, further comprising the step of using the  
2 EP parameter blocks to describe a route between a selected EP and a selected AP.

1 Claim 18 (original): The method according to Claim 1, wherein a short-range wireless link  
2 established through at least one of the two short-range wireless connections uses an omnidirectional

3 antenna at a first endpoint of the wireless link and a directional antenna at a second endpoint of the  
4 wireless link.

1 Claim 19 (original): The method according to Claim 18, wherein a position of the directional  
2 antenna is set to minimize a bit error rate along the wireless link.

1 Claim 20 (original): The method according to Claim 19, further comprising the step of dynamically  
2 determining the position of the directional antenna, further comprising the steps of:

3 positioning the directional antenna at a plurality of angles toward the omnidirectional  
4 antenna;

5 recording the bit error rate at each of the angles; and

6 selecting that one of the angles which exhibits a minimal value of the bit error rate to be the  
7 position of the directional antenna.

1 Claim 21 (original): The method according to Claim 20, wherein the plurality of angles are selected  
2 by first locating an initial position beyond which communication using the directional antenna is not  
3 possible.

1 Claim 22 (original): The method according to Claim 18, wherein a power of transmission of the  
2 directional antenna is set to a minimum value required to communicate on the wireless link.

1 Claim 23 (original): The method according to Claim 22, further comprising the step of dynamically

2 determining the power of transmission of the directional antenna, further comprising the steps of:  
3 establishing a default value for the power of transmission;  
4 recording a bit error rate at the default value;  
5 successively reducing the power of transmission until connectivity is lost or the bit error rate  
6 crosses a threshold; and  
7 setting the power of transmission to be a value that results in the bit error rate staying below  
8 the threshold.

1 Claim 24 (original): The method according to Claim 23, wherein the threshold is a maximum  
2 acceptable value for the bit error rate.

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Claims 25 - 32 (canceled)

1 Claim 33 (original): Computer program instructions embodied on one or more computer-readable  
2 media, the computer program instructions adapted for enabling communication between at least one  
3 end device and at least one application server in a short-range wireless networking environment and  
4 comprising:  
5 computer program instructions for communicating with at least one access point (AP),  
6 wherein each of the APs has at least one short-range wireless connection and at least one network  
7 connection;  
8 computer program instructions for communicating with at least one extension point (EP),  
9 wherein:

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10 each of the EPs has at least two short-range wireless connections;  
11 at least one of the EPs communicates with at least one of the APs; and  
12 at least one of the EPs communicates with at least one of the end devices; and  
13 computer program instructions for transmitting traffic between a selected one of the  
14 application servers and a selected one of the end devices, wherein the transmitted traffic flows  
15 through a selected one of the APs and at least one of the EPs.

1 Claim 34 (original): The computer program instructions according to Claim 33, wherein a short-  
2 range wireless link established through at least one of the two short-range wireless connections uses  
3 a protocol known as "Bluetooth".

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1 Claim 35 (original): The computer program instructions according to Claim 33, wherein one of the  
2 at least two short-range wireless connections uses a directional antenna.

1 Claim 36 (original): The computer program instructions according to Claim 35, wherein the  
2 directional antenna is used to communicate with a selected one of the

1 Claim 37 (original): The computer program instructions according to Claim 35, wherein the  
2 directional antenna is used to communicate with another EP.

1 Claim 38 (original): The computer program instructions according to Claim 33, wherein one of the  
2 at least two short-range wireless connections uses an omnidirectional antenna.

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1 Claim 39 (original): The computer program instructions according to Claim 38, wherein the  
2 omnidirectional antenna is used to communicate with a selected one of the end devices.

1 Claim 40 (original): The computer program instructions according to Claim 38, wherein the  
2 omnidirectional antenna is used to communicate with another EP.

1 Claim 41 (original): The computer program instructions according to Claim 33, wherein each EP is  
2 powered using a photovoltaic array or photovoltaic module.

1 Claim 42 (original): The computer program instructions according to Claim 33, wherein each EP  
2 comprises an antenna controller, an amplifier, a power supply, and a short-range communication  
3 function.

1 Claim 43 (original): The computer program instructions according to Claim 42, wherein the short-  
2 range communication function is a Bluetooth module.

1 Claim 44 (original): The computer program instructions according to Claim 33, wherein each EP  
2 comprises an antenna controller, an amplifier, a power supply, and a short-range radio frequency  
3 communication module.

1 Claim 45 (original): The computer program instructions according to Claim 44, wherein the short-

2 range radio frequency communication module is a Bluetooth module.

1 Claim 46 (original): The computer program instructions according to Claim 33, wherein the at least  
2 one EP communicating with the at least one AP and the at least one EP communicating with the at  
3 least one end device are the same EP.

1 Claim 47 (original): The computer program instructions according to Claim 33, further comprising  
2 computer program instructions for providing a connection table which maintains a plurality of EP  
3 parameter blocks.

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1 Claim 48 (original): The computer program instructions according to Claim 47, wherein the  
2 connection table is provided at a network control server.

1 Claim 49 (original): The computer program instructions according to Claim 47, further comprising  
2 computer program instructions for using the EP parameter blocks to describe a route between a  
3 selected EP and a selected AP.

1 Claim 50 (original): The computer program instructions according to Claim 33, wherein a short-  
2 range wireless link established through at least one of the two short-range wireless connections uses  
3 an omnidirectional antenna at a first endpoint of the wireless link and a directional antenna at a  
4 second endpoint of the wireless link.

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1 Claim 51 (original): The computer program instructions according to Claim 50, wherein a position  
2 of the directional antenna is set to minimize a bit error rate along the wireless link.

1 Claim 52 (original): The computer program instructions according to Claim 51, further comprising  
2 computer program instructions for dynamically determining the position of the directional antenna,  
3 further comprising:

4 computer program instructions for positioning the directional antenna at a plurality of angles  
5 toward the omnidirectional antenna;

6 computer program instructions for recording the bit error rate at each of the angles; and

7 computer program instructions for selecting that one of the angles which exhibits a minimal  
8 value of the bit error rate to be the position of the directional antenna.

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1 Claim 53 (original): The computer program instructions according to Claim 52, wherein the  
2 plurality of angles are selected by first locating an initial position beyond which communication  
3 using the directional antenna is not possible.

1 Claim 54 (original): The computer program instructions according to Claim 50, wherein a power of  
2 transmission of the directional antenna is set to a minimum value required to communicate on the  
3 wireless link.

1 Claim 55 (original): The computer program instructions according to Claim 54, further comprising  
2 computer program instructions for dynamically determining the power of transmission of the

3 directional antenna, further comprising:

4 computer program instructions for establishing a default value for the power of  
5 transmission;

6 computer program instructions for recording a bit error rate at the default value;

7 computer program instructions for successively reducing the power of transmission until the  
8 bit error rate crosses a threshold; and

9 computer program instructions for setting the power of transmission to be a value that  
10 results in the bit error rate staying below the threshold.

1 Claim 56 (original): The computer program instructions according to Claim 55, wherein the  
2 threshold is a maximum acceptable value for the bit error rate.

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Claims 57 - 63 (canceled)

1 Claim 64 (original): A system for enabling communication between at least one end device and at  
2 least one application server in a short-range wireless networking environment, comprising:

3 at least one access point (AP), wherein each of the APs has at least one short-range wireless  
4 connection and at least one network connection;

5 at least one extension point (EP), wherein each of the EPs has at least two short-range  
6 wireless connections;

7 means for establishing communication between at least one of the EPs and at least one of  
8 the APs; and

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9 means for establishing communication between at least one of the EPs and at least one of  
10 the end devices; and

11 means for transmitting traffic between a selected one of the application servers and a  
12 selected one of the end devices, wherein the transmitted traffic flows through a selected one of the  
13 APs and at least one of the EPs.

1 Claim 65 (original): The system according to Claim 64, wherein:

2 a short-range wireless link established through at least one of the two short-range wireless  
3 connections uses a protocol known as "Bluetooth";

4 one of the at least two short-range wireless connections uses a directional antenna; and

5 one of the at least two short-range wireless connections uses an omnidirectional antenna.

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1 Claim 66 (original): The system according to Claim 65, wherein the directional antenna is used to  
2 communicate with a selected one of the APs.

1 Claim 67 (original): The system according to Claim 65, wherein the omnidirectional antenna is  
2 used to communicate with one or more of (1) a selected one of the end devices and (2) another EP.

1 Claim 68 (original): The system according to Claim 64, wherein each EP comprises an antenna  
2 controller, an amplifier, a power supply, and a short-range communication function.

1 Claim 69 (original): The system according to Claim 68, wherein the short-range communication

2 function is a Bluetooth module.

1 Claim 70 (original): The system according to Claim 64, wherein the at least one EP communicating  
2 with the at least one AP and the at least one EP communicating with the at least one end device are  
3 the same EP.

1 Claim 71 (original): The system according to Claim 64, further comprising means for providing a  
2 connection table which maintains a plurality of EP parameter blocks.

1 Claim 72 (original): The system according to Claim 71, wherein the connection table is provided at  
2 a network control server.

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1 Claim 73 (original): The system according to Claim 71, further comprising means for using the EP  
2 parameter blocks to describe a route between a selected EP and a selected AP.

1 Claim 74 (original): The system according to Claim 64, wherein a short-range wireless link  
2 established through at least one of the two short-range wireless connections uses an omnidirectional  
3 antenna at a first endpoint of the wireless link and a directional antenna at a second endpoint of the  
4 wireless link.

1 Claim 75 (original): The system according to Claim 74, wherein a position of the directional  
2 antenna is set to minimize a bit error rate along the wireless link, and further comprising means for

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3 dynamically determining the position of the directional antenna, further comprising:  
4 means for positioning the directional antenna at a plurality of angles toward the  
5 omnidirectional antenna;  
6 means for recording the bit error rate at each of the angles; and  
7 means for selecting that one of the angles which exhibits a minimal value of the bit error rate  
8 to be the position of the directional antenna.

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1 Claim 76 (original): The system according to Claim 75, wherein:

2 the plurality of angles are selected by first locating an initial position beyond which  
3 communication using the directional antenna is not possible; and  
4 a power of transmission of the directional antenna is set to a minimum value required to  
5 communicate on the wireless link; and  
6 further comprising means for dynamically determining the power of transmission of the  
7 directional antenna, further comprising:  
8 means for establishing a default value for the power of transmission;  
9 means for recording a bit error rate at the default value;  
10 means for successively reducing the power of transmission until the bit error rate  
11 crosses a threshold; and  
12 means for setting the power of transmission to be a value that results in the bit error  
13 rate staying below the threshold.

Claims 77 - 81 (canceled)

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1 Claim 82 (original): An extension point (EP) device for enabling communication between at least  
2 one of a plurality of end devices and at least one application server in a short-range wireless  
3 networking environment, comprising:

4 means for establishing at least two short-range wireless connections from the EP;

5 means for communicating, from the EP, with at least one access point (AP), wherein each of  
6 the APs has at least one short-range wireless connection and at least one network connection;

7 means for communicating, from the EP, with at least one of the end devices; and

8 means for transmitting traffic between the application server and the at least one end device,  
9 wherein the transmitted traffic flows through a selected one of the APs and the EP.

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1 Claim 83 (original): The device according to Claim 82, wherein:

2 a short-range wireless link established through at least one of the two short-range wireless  
3 connections uses a protocol known as "Bluetooth";

4 one of the at least two short-range wireless connections uses a directional antenna; and

5 one of the at least two short-range wireless connections uses an omnidirectional antenna.

1 Claim 84 (original): The device according to Claim 83, wherein the directional antenna is used to  
2 communicate with a selected one of the APs.

1 Claim 85 (original): The device according to Claim 83, wherein the omnidirectional antenna is used  
2 to communicate with one or more of: (1) a selected one of the end devices and (2) another EP.

1 Claim 86 (original): The device according to Claim 82, wherein each EP comprises an antenna  
2 controller, an amplifier, a power supply, and a short-range communication function.

1 Claim 87 (original): The device according to Claim 86, wherein the short-range communication  
2 function is a Bluetooth module.

1 Claim 88 (original): The device according to Claim 82, wherein the at least one EP communicating  
2 with the at least one AP and the at least one EP communicating with the at least one end device are  
3 the same EP.

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1 Claim 89 (original): The device according to Claim 82, wherein a short-range wireless link  
2 established through at least one of the two short-range wireless connections uses an omnidirectional  
3 antenna at a first endpoint of the wireless link and a directional antenna at a second endpoint of the  
4 wireless link.

1 Claim 90 (original): The device according to Claim 89, wherein a position of the directional  
2 antenna is set to minimize a bit error rate along the wireless link, and further comprising means for  
3 dynamically determining the position of the directional antenna, further comprising:  
4 means for positioning the directional antenna at a plurality of angles toward the  
5 omnidirectional antenna;  
6 means for recording the bit error rate at each of the angles; and  
7 means for selecting that one of the angles which exhibits a minimal value of the bit error rate

8 to be the position of the directional antenna.

1 Claim 91 (original): The device according to Claim 90, wherein:

2 the plurality of angles are selected by first locating an initial position beyond which

3 communication using the directional antenna is not possible; and

4 a power of transmission of the directional antenna is set to a minimum value required to

5 communicate on the wireless link; and

6 further comprising means for dynamically determining the power of transmission of the

as 7 directional antenna, further comprising:

8 means for establishing a default value for the power of transmission;

9 means for recording a bit error rate at the default value;

10 means for successively reducing the power of transmission until the bit error rate

11 crosses a threshold; and

12 means for setting the power of transmission to be a value that results in the bit error

13 rate staying below the threshold.

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